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12/21/54 - RES, 12/27/54 POSTWAR MARKET SITUATION FOR PYRETHRUM

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Introduction



Now that hostilities are over, the problems of full-scale international competition come into play in many internationally traded commodities. Among these is pyrethrum. Certain additional factors now enter into the determination of market prices and market conditions. Whether these factors will be price-strengthening or price-weakening depends on the particular situation. These factors will be discussed specifically in the case of pyrethrum.

The heavy use of pyrethrum by the armed forces of both the Allies and Japan will diminish substantially. Large stock piles of the raw and finished insecticide are no longer necessary for military progress, and civilian inventories will increase. Previous sources of supply will re-enter the market after a greater or smaller lapse of time. New synthetics and synergists may upset the entire pattern of prewar use. Cartel or monopoly arrangements may maintain prices and limit usage. These will be dealt with individually.

During the war there was heavy military usage of the insecticide by the armed forces of the United States, the British Empire, and Japan and less substantial use by troops of other warring powers. Small amounts were available for certain "essential" civilian needs, but the great bulk of normal peacetime users were barred access to this important insecticide. At the same time, the actual importations of pyrethrum flowers into the United States, the largest user, were much less than in prewar years. This was due in part to the cutting off of previous sources of supply in Japan and Yugoslavia, in part to wartime shipping problems, but in the main due to drought and production problems in British East Africa, the main producing area.

As of August 18, 1945, the U. S. Army canceled all orders for "aerosol" bombs in which a solution of pyrethrum and freon gas, and more recently 3 percent of DDT, were combined for use as an insect spray. Continued manufacture of these aerosol bombs is providing a number of stores with supplies at a ceiling price of \$4.00 per unit with refills at \$2.00 per unit. The armed forces have a considerable stock of these bombs, since their success in spraying islands with DDT just prior to invasion reduced the use of aerosols considerably. Nevertheless, they will continue to be used so long as troops remain in tropical or subtropical areas. Restrictions on civilian end uses were lifted August 24, thus permitting full exploitation of the civilian market during 1946.

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- 2 -

### Historical Production Pattern

During World War I, the center of production of pyrethrum flowers shifted from the Dalmatian coast of Yugoslavia to Japan. After the war Japan continued to dominate the market because of lower cost production, but considerable supplies were obtained from Yugoslavia. A number of countries, including the United States, began experiments with pyrethrum in the inter-war years. The most successful of these were in England and later in Kenya Colony in British East Africa. They succeeded in producing pyrethrum flowers with a higher pyrethrin content (the toxic material) and in time developed very efficient production, central marketing methods, standardization, and exportation procedures. They were able to guarantee 1.3-percent pyrethrins on arrival in New York as compared with the usual 0.8-or 0.9-percent content of Japanese flowers. Large exportations from Kenya began in 1936, and by 1940 they had become so heavy that the absorption of considerable amounts of Japanese flowers by the Japanese military forces for use in Manchuria was little noticed in the market. In 1939 slightly over half the United States imports came from Japan, but in 1940 over 80 percent of a slightly smaller total came from Kenya Colony. This dominance of supplies from Kenya has continued with the war, but the Belgian Congo and Brazil have become small suppliers of some importance. (See table 1 for details.)

As the result of poor weather and food shortages in East Africa in 1942-43, it was found necessary to increase prices substantially from those established by price ceilings in 1942. This was done in July 1944, when the present price of about 32 cents, New York market, for 1.3-percent flowers was established. Although growing conditions are much improved, the present price to the Kenya farmers is guaranteed by a contract between the producers and the British Ministry of Food until 1947.

### Importations

The United States is by far the largest consumer of pyrethrum flowers, normally taking over three-fourths of total world production. Prewar importations ranged from 4,500,000 pounds of flowers in 1931 to 20,000,000 pounds in 1937, with virtually the same prices in the 2 years. Imports averaged 14,500,000 pounds of flowers for 1936-40, compared with 10,000,000 pounds in the previous decade. Furthermore, the pyrethrin content was higher in the later years, and technical extraction and processing methods had improved, thus indicating relatively an even greater increase in end use than suggested by the above figures. Imports in 1941-44 averaged less than 9,500,000 pounds per year.

Declared values on arrival in the United States have varied from a yearly average of 8 cents per pound in 1936 to 23.4 cents in 1939 and 1940, and have averaged around 15 cents per pound. Present prices are higher than any recent prices. (See table 1 for details.)

### Products Competitive with Pyrethrum

Before the war two synthetic products, lethane 384 and thanite, competed directly with pyrethrum. These materials do not have so great a "knock-

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down" effect as pyrethrum, but they do operate more rapidly in proper concentrations than does DDT. Prices appear to have been set by the proprietary companies so that the compounded spray was always slightly cheaper than pyrethrum spray. Possibly with the present high price of pyrethrum, price margins would be greater and induce a greater use of these substitutes.

In 1941 the discovery was made that the use of sesamin (from sesame oil) as a synergist would reduce by about 50 percent the amount of pyrethrins needed for killing certain insects. Considerable work on compounds related to sesamin has been carried out during the war. As a result of this, several synergists have been developed which will reduce the quantity of pyrethrum needed per unit of spray and hence extend the supply of pyrethrum.

The most famous possible substitute is DDT, together with other possible synthetics with similar compositions. While most synthetic insecticides are toxic to a narrower range of insects than natural products like pyrethrins and rotenone, DDT is toxic to a wide range of insects. Nevertheless, there are a great many insects resistant to DDT which are susceptible to either pyrethrum or rotenone, and others resistant to the latter which are killed by DDT. In time each of these will be used for particular insects and in situations where scientific experience indicates the one most effective. Moreover, pyrethrum causes a rapid paralysis of insects, but as ordinarily used it is not persistent, whereas DDT kills more slowly but leaves a residue on sprayed surfaces that retains its toxicity for several weeks. The use of pyrethrum was increasing before the war, and the use of insecticides in general seems certain to be considerably greater in the future than before the war. For certain uses the trend in manufacturing appears to be in the direction of using mixtures of toxic compounds rather than one product alone, but in other uses the trend is toward very specific preparations for one insect, or one group of insects. Small gardens seem to require mixtures, whereas most agricultural uses are becoming very specific. There seems to be a strong probability that household sprays and part of the cattle sprays will be made with somewhat less pyrethrum than before the war but with DDT added so as to have both an instantaneous and a lasting lethal effect on the insects. While the addition of DDT may reduce the number of sprayings needed for effective control, the greatly increased effectiveness of the spray will induce many people to use insecticides who did not use them before. Thus, this complementarity between pyrethrum and DDT suggests that DDT, instead of displacing pyrethrum, may lead to its increased use.

Present and Potential Production 1/

Kenya Colony is the leader in world pyrethrum production by a wide margin. Its level of production is as high as Japan's in the 1930's and dominant in the Allied world; the flowers are of the highest quality on the market; the farm cost is as low as in any other country; and the assembling and marketing system is very efficient. The uniform, high quality of the Kenya flowers gives them a preferred position in the market.

1/ Figures in this section are still confidential.

Production in Kenya Colony has been increasing since 1935, except for the drought period in 1942-43. The present production capacity is estimated at 20,000,000 pounds of flowers. Part of this increased production results from higher price of flowers and would decrease if the price were to drop to prewar levels. (Price relationships with food crops need to be considered to determine how much.) New producers in Brazil and the Belgian Congo are likely to supply over 4,000,000 pounds of flowers in 1945. Production in India and Eritrea will total about 500,000 pounds, the exportable surplus going largely to British Empire users. Production in France, Peru, Argentina, and other countries is small and consumed locally. There is a large stock pile (largely private) of about 6,000,000 pounds in the United States. Beyond this there are large potential imports from Japan and Yugoslavia. The latter may be used entirely in Europe. Whether Japanese exports will be large, small, or nonexistent cannot be determined until more information is available about the situation of the Japanese industry and the commercial and political policies which will be followed in the treatment of Japan. Thus, there is available to the United States and Great Britain for use in the next 12 months some 31,000,000 pounds of flowers, including inventories and new supplies and excluding any possible importations from Yugoslavia and Japan. This is nearly 2 years' supply of flowers at the 1936-40 level of consumption, or about 18 months' supply at predicted postwar levels of consumption (excluding supplies to rebuild retail inventories).

#### Current Situation

With control over end uses of pyrethrum abolished at this time, it is possible to restock inventories and exploit the market thoroughly in 1946, with the possible exception of some export markets. In a number of foreign countries, such as Argentina and Peru, the price of pyrethrum flowers is high, and moderate amounts would be purchased, but this probably reflects the shortages of imports rather than a new or increased demand. The present high price, approximately 32 cents per pound in the United States, will tend to encourage the use of other insecticidal materials. However, with the current high level of national income both at home and abroad, there will be a substantially larger use of insecticides in general. It may be that the wide publicity received by DDT will affect somewhat adversely sales of other insecticides this first year, beyond that outlined above, but this will depend upon advertising campaigns, fortuitous events, further research results, and the production and sales policies of the manufacturers.

There is reported to be considerable uncertainty in the trade as to the sort of production-price policies they ought to follow. Much of this stems from the monopoly position of the Kenya Farmers' Association, the marketing organization of that Colony's pyrethrum producers. Except for Japanese production, they are so dominant that they are in a position to set prices within a considerable range without fear of materially increasing production in other countries. At present, the producers are hopeful about maintaining current high prices, in spite of possible synthetic competitors and Japanese production, whereas United States purchasers are hoping that it will be possible to bring the prices down.

Earlier analysis suggests that the present price is too high permanently to dispose of all the flowers coming from present productive capacity, but it suggests also that much larger quantities would be used than before the war if prewar, or lower, prices of pyrethrum were in effect. Some readjustments of prices appear to be inevitable in the long run, particularly if Japan exports any appreciable quantity to the United States. If the United States comes reasonably close to maintaining full employment, the use of insecticides will greatly increase. Pyrethrum will participate in this increased use to the extent that its prices are in line with those of its substitutes. According to people well acquainted with the trade, an annual consumption of 15,000,000 to 20,000,000 pounds of flowers in the United States and a price of 20 to 25 cents per pound for 1.3-percent pyrethrin flowers appears to be a fairly realistic assumption for the longer run. However, there are still a number of factors to be worked out in the next year and a half which may influence both production and use considerably and seriously modify these figures.

#### Latin American Prospects

The above analysis suggests that Latin American countries need to emphasize quality production and efficient marketing if they expect to produce any flowers for export. It will be necessary to produce flowers competitive with those of Kenya Colony. If prices are maintained at an artificially high level by Kenya producers, it will be possible to sell even medium-quality flowers at remunerative prices. But if prices and production are competitive, the Kenya producers probably can put higher quality flowers on the market at lower costs than any other present-day producers. Japan may be forced to sell its lower quality pyrethrum flowers in the United States at almost any price in order to obtain foreign exchange, thus limiting prices for the higher quality flowers. Latin American producers should strive to produce flowers competitive with Kenya production, rather than Japanese, so as to obtain the higher price paid for higher quality. It may be difficult to sell small lots of medium or variable flowers from Latin America. But guaranteed 1.3-percent pyrethrum-content flowers efficiently produced and marketed should bring farmers a fairly remunerative price.

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Table 1. - PYRETHRUM OR INSECT FLOWERS, CRUDE: United States imports for consumption, by principal sources, selected years 1931 - 40 - 7 -

Country	1931	1934	1937	1940	Average 1931-40
QUANTITY (POUNDS)					
Western Hem. 2/---	3,287	4,480	661	79,530	66,490
British E. Africa	-	-	1,422,803	10,386,974	2,187,856
Belgian Congo -----	-	-	-	16,965	1,917
Japan -----	3,871,842	10,093,612	17,849,611	2,030,746	9,749,320
Yugoslavia -----	3/ 1,561	298,684	519,099	66,142	321,592
Italy -----	365,364	113,533	276,807	10,853	186,083
All other -----	279,089	80,462	22,615	-	64,119
Total -----	4,521,143	10,590,771	20,091,596	12,591,210	12,578,177
VALUE (DOLLARS)					
Western Hem. 2/---	378	1,086	33	13,040	.9,045
British E. Africa	-	-	139,331	2,512,517	438,374
Belgian Congo -----	-	-	-	5,384	601
Japan -----	452,833	1,985,604	1,994,832	408,621	363,596
Yugoslavia -----	3/ 167	47,596	46,747	8,289	34,615
Italy -----	40,656	17,152	22,072	1,360	19,481
All other -----	28,069	8,054	1,386	-	6,072
Total -----	522,103	2,059,492	2,204,451	2,949,211	1,921,704
VALUE PER POUND					
Western Hem. 2/---	\$0.115	\$0.242	\$0.126	\$0.164	\$0.130
British E. Africa -	-	-	.098	.242	.223
Belgian Congo -----	-	-	-	.317	.314
Japan -----	.117	.197	.112	.201	.140
Yugoslavia -----	.107	.159	.090	.125	.100
Italy -----	.111	.151	.080	.125	.104
All other -----	.101	.100	.061	-	.095
Total -----	.115	.194	.110	.234	.153
PERCENT OF TOTAL QUANTITY					
Western Hem. 2/ -----	0.1	5/	5/	0.6	0.5
British E. Africa --	-	-	7.1	82.6	17.4
Belgian Congo -----	-	-	-	.1	5/
Japan -----	85.6	95.3	88.8	16.1	77.5
Yugoslavia -----	5/	2.8	2.6	.5	2.6
Italy -----	8.1	1.1	1.4	.1	1.5
All other -----	6.2	.8	.1	-	.5
Total -----	100.0	100.0	100.0	100.0	100.0

1/ Preliminary.

2/ Almost entirely Brazil; Peru and Chile exported small amounts in some years, and Guatemala in August 1945.

3/ Includes Albania.

4/ Represents prices f.o.b. foreign shipping point.

5/ Less than 0.05 percent.

Source: Compiled from official statistics of the U. S. Department of Commerce.

8

Table 1. Cont'd - PYRETHRUM OR INSECT FLOWERS, CRUDE: United States imports for consumption, by principal sources, selected years 1941 - 45

Country	1941	1942	1943 1/	1944 1/	1945 (8 mo.) 1/
QUANTITY (POUNDS)					
Western Hem. 2/ ---	10,983	399,708	593,317	2,202,540	1,829,049
British E. Africa -	10,068,438	8,829,997	5,984,807	7,685,064	7,592,269
Belgian Congo -----	178,685	222,645	199,721	770,405	2,513,527
Japan -----	762,400	-	-	-	-
Yugoslavia -----	-	-	-	-	-
Italy -----	-	-	-	-	-
All other -----	-	-	-	-	-
Total -----	11,020,506	9,452,350	6,777,845	10,658,009	11,934,845
VALUE (DOLLARS)					
Western Hem. 2/ ---	1,525	60,113	118,369	345,590	288,658
British E. Africa -	1,721,780	1,473,512	987,545	1,925,822	2,098,566
Belgian Congo -----	34,411	36,779	38,954	189,289	681,686
Japan -----	84,630	-	-	-	-
Yugoslavia -----	-	-	-	-	-
Italy -----	-	-	-	-	-
All other -----	-	-	-	-	-
Total -----	1,842,346	1,570,404	1,144,868	2,460,701	3,068,910
VALUE PER POUND					
Western Hem. 2/ ---	\$0.139	\$0.150	\$0.200	\$0.157	.150
British E. Africa --	.171	.167	.165	.251	.276
Belgian Congo -----	.193	.165	.195	.246	.271
Japan -----	.111	-	-	-	-
Yugoslavia -----	-	-	-	-	-
Italy -----	-	-	-	-	-
All other -----	-	-	-	-	-
Total -----	.167	.166	.169	.231	.257
PERCENT OF TOTAL QUANTITY					
Western Hem. 2/ ---	0.1	4.2	8.8	14.0	15.3
British E. Africa --	91.4	93.4	88.3	78.3	63.6
Belgian Congo -----	1.6	2.4	2.9	7.7	21.1
Japan -----	6.9	-	-	-	-
Yugoslavia -----	-	-	-	-	-
Italy -----	-	-	-	-	-
All other -----	-	-	-	-	-
Total -----	100.0	100.0	100.0	100.0	100.0

1/ Preliminary.

2/ Almost entirely Brazil; Peru and Chile exported small amounts in some years, and Guatemala in August 1945.

3/ Includes Albania.

4/ Represents prices f.o.b. foreign shipping point.

5/ Less than 0.05 percent.

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